



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/613,559

07/02/2003

Hardayal Singh Gill

HIT1P015/HSJ9-2003-0118US

6848

28875

7590

07/28/2006

Zilka-Kotab, PC

P.O. BOX 721120

SAN JOSE, CA 95172-1120

EXAMINER

CHEN, TIANJIE

ART UNIT

PAPER NUMBER

2627

DATE MAILED: 07/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/613,559

Applicant(s)

GILL, HARDAYAL SINGH

Examiner

Tianjie Chen

Art Unit

2627

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Non-Final Rejection (RCE)

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/05/2006 has been entered. Claims 1-34 are pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-11, 14-22, 24-26, and 29-34 are rejected under 35 U.S.C. 102(b) as being anticipated by Parkin (US 6,153,320).

Claims 1 and 9, Parkin shows a magnetic head in Fig. 1, including: a free layer 90 (Column 4, line 9), an antiferromagnetic layer 66 (Column 4, line 28) spaced apart from the free layer; and an antiparallel (AP) pinned layer structure 70 (Column 4, line 19) positioned between the free layer and the antiferromagnetic layer and having a net magnetic moment equal to about zero (Column 4, lines 55-59); wherein the AP pinned layer structure includes antiparallel pinned layers 72 and 74 and an AP coupling layer 73 (Column 4, lines 19-24), wherein the antiparallel pinned layers have

Art Unit: 2627

identical thickness of 30 Å (Column 4, lines 19-24) measured in a direction perpendicular to planes of deposition thereof; ; wherein the antiferromagnetic layer inherently provides a coercivity that enhances pinning of the AP pinned layer structure since it is basic function of a pinning layer; the thickness of the AP coupling layer is chosen as 5 Å and the thickness of the pinned layers are selected as 30 Å , which provide a pinned layer structure field of at least 5/ or 10 KOe (Fig. 3).

Claim 7, Parkin shows the antiferromagnetic layer is made of PtMn (Column 4, line 27-31), which is the same material as used in this Application, which inherits a high positive magnetostriction.

Claim 8, Parkin also shows that the AP pinned layer structure includes at least two pinned layers having magnetic moments that are self-pinned antiparallel to each other, the pinned layers being separated by an AP coupling layer (Column 4, lines 51-59).

Claim 10, the magnetic anisotropy always has two direction, one is easy axis and another is hard axis. Anisotropy of the AP pinned layer structure should have two orthogonal directions, Fig. 1 shows that one is perpendicular and one is parallel to the ABS of the reading head.

Claim 14, Parkin shows that the head forms part of a GMR head (Column 1, lines 14-18).

Claims 15-17, Parkin shows that the head forms part of a CPP/or CIP/or tunnel junction sensor (Column 1, lines 14-18).

Claim 33, Parkin further shows it is sued for a magnetic storage system (Abstract), which inherits: magnetic media; at least one head for reading from and writing to the magnetic media, each head having: a sensor having the structure

Art Unit: 2627

described above, a write element coupled to the sensor; a slider for supporting the head; and a control unit coupled to the head for controlling operation of the head.

Claims 4 and 5, Parkin shows that the antiferromagnetic layer is constructed of PtMn having thickness of 90 Å (Column 4, lines 27-31).

Claims 18, 21, and 24, as described above, Parkin shows a magnetic head, including: a free layer, an antiferromagnetic layer spaced apart from the free layer, the antiferromagnetic layer being constructed of PtMn having a thickness of 90 Å; and an antiparallel (AP) pinned layer structure positioned between the free layer and the antiferromagnetic layer, wherein the AP pinned layer structure includes at least two pinned layers having magnetic moments that are self-pinned antiparallel to each other through large magnetic anisotropy due to positive magnetostriction and a small net moment for the antiparallel pinned layers, the pinned layers being separated by an AP coupling layer; wherein the antiferromagnetic layer provides a coercivity that enhances pinning of the AP pinned layer structure; and the thickness of the AP coupling layer and the thickness of the pinned layers are selected to provide a pinned layer saturation field of at least 5/or 10 KOe.

Claims 2, 3, 6, 19, and 20; Parkin shows the antiferromagnetic layer, which is made of PtMn, which is the same as disclosed in this Application; therefore, it should inherit a coercivity of at least about 300/400 Oe.

Claims 11 and 26, Parkin shows a head as described above, does not specifically show that the head is adapted to read from media having a bit density of at least about 200 Gbit/in.

However, applicant claims that his head is adapted to read from media having a bit density of at least about 200 Gbit/in without disclosing particular features directly

Art Unit: 2627

for reaching this specific density. Parkin shows a head having same structure as described above. One of ordinary skill in the art would have been reasonably expect that can also be adapted to read from media having a bit density of at least about 200 Gbit/in.

Claim 22, as described above, Parkin shows that the antiferromagnetic layer has a high positive magnetostriction.

Claim 25, as described above, Parkin shows that the magnetic anisotropy of the AP pinned layer structure is oriented perpendicular to an ABS of the reading head.

Claims 29-32, as described above Parkin shows a head, wherein the head forms part of a GMR head/CPP/CIP/tunnel junction sensor (Column 1, lines 14-18).

Claim 34, as described above, Parkin shows a magnetic storage system (Column 3, line 30), which inherits magnetic media; at least one head for reading from and writing to the magnetic media, each head having: a sensor having the structure as described above, a write element coupled to the sensor; a slider for supporting the head; and a control unit coupled to the head for controlling operation of the head.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 12, 13, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parkin in view of Pinarbasi (US 2003/0179513).

Art Unit: 2627

Claims 12 and 27, Parkin suggest that transverse and longitudinal bias layers (not shown), may be required to provide an optimal sensor (Column 4, line 41-43). Pinarbasi shows an in-stack bias layer 240, the bias layer stabilizing the free layer, the AP pinned layer structure stabilizing the in-stack bias layer ([0046]). Claims 13 and 28, Pinarbasi shows in Fig 9 a head including a bias layer 140 formed along a track edge of the head, the bias layer stabilizing the free layer. It would have been obvious at the time the invention was made to one of ordinary skill in the art to add the bias layer for optimizing the sensor.

4. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parkin in view of Parker et al (US 2004/0057164).

Claim 23, Parker et al shows that NiFe and CoFe are alternatives used for a pinned layer ([0032]); it is also well known in the art NiFe and CoFe are most commonly used material for the pinned layer. One of ordinary skill in the art would have been expected to have included CoFe as an alternative of NiFe for the pinned layer; Parkin also shows that the AP coupling layer is constructed of Ru.

Response to Arguments

5. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tianjie Chen whose telephone number is 571-272-7570. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

Art Unit: 2627

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on 571-272-7579. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


TIANJIE CHEN
PRIMARY EXAMINER